



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/573,810	03/28/2006	Nobuo Miyadera	396.46073X00	9359
20457 7590 10/18/2007 ANTONELLI, TERRY, STOUT & KRAUS, LLP 1300 NORTH SEVENTEENTH STREET SUITE 1800 ARLINGTON, VA 22209-3873			EXAMINER BEDTELYON, JOHN M	
			ART UNIT 2874	PAPER NUMBER
			MAIL DATE 10/18/2007	DELIVERY MODE PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary

Application No.

10/573,810

Applicant(s)

MIYADERA ET AL.

Examiner

John M. Bedtelyon

Art Unit

2874

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 08 August 2007.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-28 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-28 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 28 March 2006 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

FINAL REJECTION

Response to Amendment

1. This action is responsive to the Amendment filed August 8th 2007. Claims 1, 2, 3, 4, 6, 7, 8, 12, 14, 15, and 16 have been amended. Claims 19-28 have been added. No claims have been canceled. Claims 1-28 are currently pending in the application.

Response to Arguments

2. Applicant's arguments with respect to claims 1-18 have been considered and thoroughly reviewed, but are moot in view of the new ground(s) of rejection, however, still relevant arguments are addressed below.

The Examiner notes that Applicant specifically argues that recitations of characteristics or properties of the claimed structure must be considered in determining patentability thereof. The Examiner did not intend to imply that these limitations were not considered in determining patentability thereof, but instead simply wanted to convey that a structure identical to the claimed structure will be assumed to have the same properties, functions and characteristics.

While the grounds of rejection have changed, in view of the amended claims, Ido is still used as a secondary reference in the rejection below. It is noted that applicant's primary argument is that the Ido reference does not teach an input waveguide with a curved structure, however, this deficiency is taught by the primary reference, please see the rejection that follows.

Lastly, Applicant states (first paragraph, page 21 of the Applicant's remarks) that "The Examiner does not even refer to the at least one optical waveguide (a) as in claim 2". The claim read (prior to amendment) at least one optical waveguide (a), out of the incident light waveguide (A). As the waveguide (a) was at least one of the waveguide (A), and there was only a single input waveguide (A), the Examiner believed the distinction was unneeded for clarity. With respect to the limitations including the asymmetric intensity distribution of the input light, these limitations were interpreted under the 35 USC 112 second paragraph rejection of the previous office action.

Drawings

3. The drawings are objected to under 37 CFR 1.83(a). The drawings must show every feature of the invention specified in the claims. Therefore, the input waveguide having a curved structure must be shown or the feature(s) canceled from the claim(s). No new matter should be entered.

Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. The figure or figure number of an amended drawing should not be labeled as "amended." If a drawing figure is to be canceled, the appropriate figure must be removed from the replacement sheet, and where necessary, the remaining figures must be renumbered and appropriate changes made to the brief description of the several views of the drawings for consistency. Additional replacement sheets may be necessary to show the renumbering

Art Unit: 2874

of the remaining figures. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either "Replacement Sheet" or "New Sheet" pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

Claim Rejections - 35 USC § 102

4. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

5. Claims 1, 4, 7, 11 and 21-24 are rejected under 35 U.S.C. 102(b) as being anticipated by Okushima (US Patent 5,664,038, hereinafter Okushima).

With respect to claim 1, Okushima teaches:

A light branching optical waveguide (10) comprising:

At least one incident light waveguide (A) (11) optically connected to one end of a multi-mode optical waveguide (13, see column 8, lines 34-38); and

Output light waveguides (B) (12A and 12B) connected to the other end of the multi mode waveguide (13);

An intensity distribution of light entering from at least one optical waveguide (a) (11) into the multi-mode optical waveguide at a connected surface of the at least one

incident light waveguide (11) and the multi-mode optical waveguide is asymmetric (due to the curve of waveguide (11)) with respect to a geometrical central axis of the at least one optical waveguide (11), the at least one optical waveguide (11) having a curved structure (see figure 2);

And an extended line of the geometrical central axis of the at least one optical waveguide (11) does not coincide with a geometrical central axis of the multi-mode optical waveguide (figure 2).

With respect to claim 4, the patentability of an apparatus depends only on the claimed structural limitations. Okushima teaches a structure that is substantially identical to that of the claimed invention, therefore the claimed properties or functions are presumed to be inherent. The burden is on the applicant to show that the Okushima device does not possess these functional characteristics. See MPEP 2112.01.

With respect to claim 7, Okushima teaches:

the at least one incident light waveguide (11) comprises one incident light waveguide (see figure 2);

the output light waveguides (12A and 12B) comprise two or more output light waveguides (see figure 2).

With respect to the branching ratio between quantities of light branched into the two or more respective output light waveguides is substantially equal, the patentability of an apparatus depends only on the claimed structural limitations. Okushima teaches a structure that is substantially identical to that of the claimed invention, therefore the claimed properties or functions are presumed to be inherent. The burden is on the

applicant to show that the Okushima device does not possess these functional characteristics. See MPEP 2112.01.

With respect to claim 11, Okushima teaches an optical device comprising the branching optical waveguide according to claim 1 (see figure 2).

With respect to claims 21-24, Okushima teaches:

A method of manufacturing a light branching optical waveguide (10), having at least one incident light waveguide (A, 11), optically connected to one end of a multi-mode optical waveguide (13), and output light waveguides (12A and 12B) larger in number than the number of incident light waveguides (11), optically connected to the other end of the multi mode optical waveguide (13), the at least one incident light waveguide (11) including at least one optical waveguide (a, 11, they're the same waveguide) having an intensity distribution of light entering the multi mode optical waveguide therefrom that is asymmetric (caused by the curve of the input waveguide (11)) to a geometrical central axis of the at least one optical waveguide (11), comprising the step of:

Positioning the at least one optical waveguide (11) such that an extended line of the geometrical central axis of the at least one optical waveguide (11) does not coincide with a geometrical axis of the multi mode optical waveguide (see figure 2);

Wherein the at least one optical waveguide (11) is curved (see figure 2).

There's one input (11) and two outputs (12A and 12B).

Claim Rejections - 35 USC § 103

6. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

7. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

8. Claims 19 and 20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Okushima (US Patent 5,664,038, hereinafter Okushima).

With respect to claims 19 and 20, Okushima teaches the limitations of claim 1 as previously stated.

Okushima does not specifically state the offset between the extended line of the geometrical central axis of the input waveguide and multi mode waveguide as 1.5 microns or .7 microns or less, however, it would have been obvious to one of ordinary skill in the art at the time the invention was made to offset the waveguides a specific amount to yield a desired branching ratio or optimum optical loss, since it has been held

that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or working ranges involves only routine skill in the art. In re Aller, 105 USPQ 233.

9. Claims 2, 3, 5, 6, 8-10, 12-18 and 25-28 are rejected under 35 U.S.C. 103(a) as being unpatentable over Okushima (US Patent 5,664,038, hereinafter Okushima) in view of Ido (US Patent 6,236,784, hereinafter Ido).

With respect to claim 2, Okushima teaches:

A light branching optical waveguide (10) comprising:

At least one incident light waveguide (A) (11) optically connected to one end of a multi-mode optical waveguide (13, see column 8, lines 34-38); and

Output light waveguides (B) (12A and 12B) connected to the other end of the multi mode waveguide (13);

An intensity distribution of light entering from at least one optical waveguide (a) (11) into the multi-mode optical waveguide at a connected surface of the at least one incident light waveguide (11) and the multi-mode optical waveguide is asymmetric (due to the curve of waveguide (11)) with respect to a geometrical central axis of the at least one optical waveguide (11), the at least one optical waveguide (11) having a curved structure (see figure.2).

Okushima does not teach the "a core shape of the multi mode optical waveguide is asymmetric with respect to a geometrical central axis of the multi mode optical waveguide".

Ido teaches an asymmetrically shaped MMI that can be used to yield intensity distribution ratios in the separate output waveguides other than the previously known equal output intensity distributions (Abstract).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to use an asymmetric multi mode section as taught by Ido in the Okushima device, because the asymmetrical shape allows for the control of output light intensity distribution in ratios other than the previously well known 1:1 (Abstract, column 1, lines 10-33) with increased efficiency (via lower unwanted radiation losses, column 3, lines 55-57).

With respect to claim 3, Okushima teaches:

an extended line of the geometrical central axis of the at least one optical waveguide (11) does not coincide with a geometrical central axis of the multi-mode optical waveguide (figure 2).

With respect to claim 5, Ido teaches:

Wherein the core shape of the multi-mode optical waveguide has a notch at at least one of its side edges (see figure 1).

With respect to claim 6, Ido teaches:

A light branching optical waveguide according to claim 5, wherein: the notch is obtained by cutting out a core of the multi-mode optical waveguide from a side to be connected to the at least one incident light waveguide (I) to a side edge of the core (see figure 1);

and a shape of the notch has a sinusoidal curve ranging from the side to be connected to the at least one incident light waveguide (I) to a side to be connected to the output light waveguides (III) (column 11, lines 51-60, and figure 1).

With respect to claims 8 and 16,

Okushima and/or Ido teaches the limitations of claims 1 and 2 as previously stated.

Okushima does not teach wherein the one of the input or one of the output waveguides comprises a single mode optical waveguide.

Ido teaches wherein at least one of the incident light waveguide (I) or the output light waveguides (III) comprises a single-mode optical waveguide (column 18, lines 21-23, while this section discusses the method of creating the structure of figure 9a, column 6, lines 49-53 states the methods can be applied to make any of the embodiments discussed).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to use the single mode optical waveguides as the at least one input or the outputs as taught by Ido in the Okushima and Ido reference because single mode optical waveguides are known to propagate light signals further with less optical loss, increasing long distance efficiency of the device.

With respect to claims 9 and 10, Okushima teaches the limitations of claim 1 as previously stated.

Okushima does not teach the multi mode waveguide being made of polymer or a polyimide resin containing fluorine.

Art Unit: 2874

Ido teaches an asymmetrically shaped MMI that can be used to yield intensity distribution ratios in the separate output waveguides other than the previously known equal output intensity distributions (Abstract) and wherein at least one of the core or a clad constituting the multi-mode optical waveguide is composed of a polymer partially or entirely and wherein the polymer comprises a polyimide-based resin containing fluorine (column 17, line 62- column 18, line 27).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to use an asymmetric multi mode section as taught by Ido in the Okushima device, because the asymmetrical shape allows for the control of output light intensity distribution in ratios other than the previously well known 1:1 (Abstract, column 1, lines 10-33) with increased efficiency (via lower unwanted radiation losses, column 3, lines 55-57).

With respect to claims 12 and 13, Ido teaches:

A light branching optical waveguide according to claim 2, characterized in that an optical central axis having a peak intensity in the intensity distribution of light entering into the multi-mode optical waveguide (II) from the optical waveguide (I) substantially coincides with the geometrical central axis of the multi-mode optical waveguide (II);

wherein the core shape of the multi-mode optical waveguide has a notch at at least one of its side edges (see figure 2).

With respect to claim 14, Ido teaches:

A light branching optical waveguide according to claim 13, wherein: the notch is obtained by cutting out a core of the multi-mode optical waveguide (II) from a side to be connected to the at least one incident light waveguide (I) to a side edge of the core (see figure 2);

and a shape of the notch has a sinusoidal curve ranging from the side to be connected to the at least one incident light waveguide (I) to a side to be connected to the output light waveguides (III) (column 11, lines 51-60, and figures 1 and 2).

With respect to claim 15, Ido teaches:

A light branching optical waveguide according to claim 2, wherein: the at least one incident light waveguide (I) comprises one incident light waveguide;

the output light waveguides (III) comprise two or more output light waveguides; (see figure 11).

With respect to the branching ratio between quantities of light branched into the two or more respective output light waveguides is substantially equal, the patentability of an apparatus depends only on the claimed structural limitations. Okushima and Ido teach a structure that is substantially identical to that of the claimed invention, therefore the claimed properties or functions are presumed to be inherent. The burden is on the applicant to show that the Okushima and Ido combination device does not possess these functional characteristics. See MPEP 2112.01.

While the Ido reference alone teaches asymmetric branching of the intensity distribution of the output waveguides, the combination of Okushima and Ido teaches an

identical structure to that of the claimed limitations, and therefor is capable of an equal output intensity ratio.

With respect to claim 17, Ido teaches:

A light branching optical waveguide according to claim 2, wherein at least one of the core or a clad constituting the multi-mode optical waveguide is composed of a polymer partially or entirely (column 17, lines 63-65, while this section discusses the method of creating the structure of figure 9a, column 6, lines 49-53 states the methods can be applied to make any of the embodiments discussed).

With respect to claim 18, Ido teaches:

An optical device comprising the light branching waveguide according to claim 2 (Abstract, lines 4-5).

With respect to claims 25-28, Okushima teaches:

A method of manufacturing a light branching optical waveguide (10) having at least one incident light waveguide (A) (11) optically connected to one end of a multi-mode optical waveguide (13, see column 8, lines 34-38); and output light waveguides (B) (12A and 12B) connected to the other end of the multi mode waveguide (13), the at least one incident light waveguide (A) including at least one optical waveguide (a, 11) having an intensity distribution of light entering the multi-mode optical waveguide at a connected surface of the at least one incident light waveguide (11) and the multi-mode optical waveguide is asymmetric (due to the curve of waveguide (11)) with respect to a geometrical central axis of the at least one optical waveguide (11), the at least one optical waveguide (11) having a curved structure (see figure 2).

Okushima does not teach the "a core shape of the multi mode optical waveguide is asymmetric with respect to a geometrical central axis of the multi mode optical waveguide".

Ido teaches an asymmetrically shaped MMI that can be used to yield intensity distribution ratios in the separate output waveguides other than the previously known equal output intensity distributions (Abstract).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to use an asymmetric multi mode section as taught by Ido in the Okushima device, because the asymmetrical shape allows for the control of output light intensity distribution in ratios other than the previously well known 1:1 (Abstract, column 1, lines 10-33) with increased efficiency (via lower unwanted radiation losses, column 3, lines 55-57).

There's one input (11) and two outputs (12A and 12B).

Conclusion

10. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the


Art Unit: 2874


shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to John M. Bedtelyon whose telephone number is 571-270-1290. The examiner can normally be reached on Monday - Friday, 10:00am - 6:30pm EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Rodney Bovernick can be reached on 571-272-2344. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.


AU 2874


primary examiner